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AND GLOVEBOX ENVIRONMENTS" vugraphs

Author(s): Crestina Vigil

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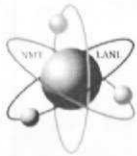


**2004 American Glovebox Society
Conference and Expo
San Diego, CA**

**Striving for Safety Excellence in Chemical and
Glovebox Environments**



**Maryrose L. Montalvo and Crestina A. Vigil
Nuclear Materials Technology Division
Los Alamos National Laboratory**



NMT Division

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The Nuclear Materials Technology Division provides the foundation for maintaining the nuclear materials mission in support of the nation's nuclear stockpile.



Two Major Facilities

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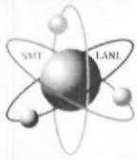
Above: TA-55 Plutonium Facility

- 375,000 ft² facility space
- 2000 personnel w/ access
- 800 on-site residents

Below: Chemistry Metallurgy Research Facility (CMR)

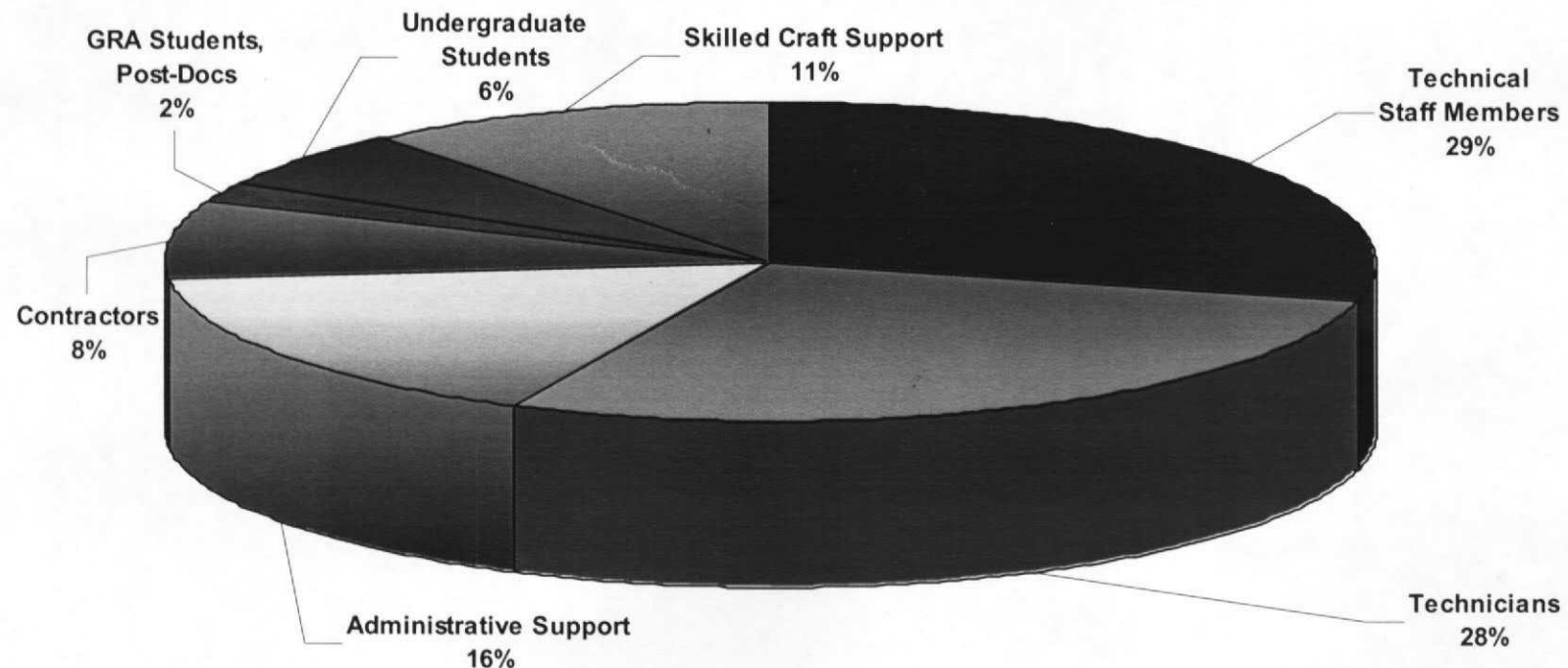
- 577,000 ft² facility space
- 900 personnel w/ access
- 400 on-site residents





NMT's Diverse Workforce

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NMT boasts of an impressive yet diverse workforce, consisting of approximately 1200 employees within both facilities: TA-55 and the CMR Building. (Approximately 57% of NMT employees are glovebox workers.)



A Behavior-Based Approach

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What is Behavior Based Safety?

Behavior-based safety employs employee involvement to reinforce safe behaviors and to identify/remove barriers to working safe. Workers perform observations on a peer-to-peer basis and provide feedback.



Left:
A behavior is any observable act. Wearing safety glasses while working in a glovebox is a behavior. Sitting on a stool is a behavior.





The Essential Elements

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**A successful behavior-based safety process
is contingent on four essential elements:**

1. Identifying critical behaviors
2. Collecting Data
3. Providing Feedback
4. Using the data to reduce
and/or remove barriers



1. Identifying Critical Behaviors

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NMT's Critical Behaviors

Observer #	Date (Mo./Day/Yr.)	# of People Observed
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<input type="checkbox"/> TA-65 BLDG.	<input type="checkbox"/> OUTSIDE	AM: <input type="checkbox"/>
<input type="checkbox"/> CWR WING		PM: <input type="checkbox"/>
<input type="checkbox"/> OTHER		OT/WKND: <input type="checkbox"/>

WORK ENVIRONMENT:	WORK TYPE:
<input type="checkbox"/> NON RAD <input type="checkbox"/> RAD	<input type="checkbox"/> GENERAL <input type="checkbox"/> ADMIN

SITE RESIDENT? <input type="checkbox"/> YES <input type="checkbox"/> NO	COACH NUMBER
--	---------------------

GROUP	<input checked="" type="radio"/> TARGETED OBSERVATION? <input type="checkbox"/> YES <input type="checkbox"/> NO
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1.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)	SAFE	AT RISK
1.1 EYE/FACE		
1.2 BODY		
1.3 HAND		
1.4 HEAD		
1.5 EARS/HEARING		
1.6 FOOT		

2.0 ERGONOMICS	SAFE	AT RISK
2.1 POSTURE/POSITION		
2.2 NECK, SHOULDER, WRIST POSTURE		
2.6 BODY MECHANICS		

3.0 RADIATION SAFETY	SAFE	AT RISK
3.1 DOWNING/OFFING/USE		
3.2 RADIOLOGICAL MONITORING/CONTAMINATION		

4.0 MATERIALS AND TRANSPORT	SAFE	AT RISK
4.1 CONTAINERS AND TRANSPORT		
4.2 RADIOACTIVE MATERIALS		
4.3 HEAVY LOADS		

5.0 ELEVATED WORK	SAFE	AT RISK
5.1 TIE OFFS		
5.2 LADDERS/SCAFFOLDS		
5.3 STAIRS		

6.0 STORED ENERGY	SAFE	AT RISK
6.1 PRESSURIZED SYSTEMS		
6.2 MECHANICAL SYSTEMS		
6.3 ELECTRICAL SYSTEMS		

7.0 COMMUNICATION	SAFE	AT RISK
7.1 STAKEHOLDERS/INVOLVED EMPLOYEES		
7.2 SIGNS AND BARRICADES		

8.0 TOOLS AND EQUIPMENT	SAFE	AT RISK
8.1 TOOL AND EQUIPMENT SELECTION		
8.2 TOOL AND EQUIPMENT CONDITION		

9.0 HOUSEKEEPING	SAFE	AT RISK
9.1 WORK AREA HOUSEKEEPING		

10.0 PHYSICAL POSITION	SAFE	AT RISK
10.1 EYES ON WORK/PATH		
10.2 LINE OF FIRE		

11.0 OTHER	SAFE	AT RISK
11.1 EMPLOYEE CONCERNS		
11.2 SITUATIONAL CONCERNS		
11.3 NOTEWORTHY SAFE BEHAVIORS		

Place completed cards in ATOMICS drop boxes or mail to MS G740



Identifying Critical Behaviors

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Sample questions from Critical Behaviors Checklist

3.1 Donning/Doffing/Use

Example: Does worker check glovebox gloves for cracks or abnormalities prior to starting work?

3.2 Radiological Monitoring/Contamination

Example: Were hands monitored slowly and thoroughly when removed from the glovebox or hood?

4.2 Radioactive Materials

Example: Are contaminated liquid or powder samples bagged or placed in a secondary container before being removed from a glovebox?

9.1 Housekeeping

Example: Are gloveboxes clear of excess equipment and trash?



2. Collecting Data

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Data is collected by performing peer-to-peer observations



- No name, no blame process
- Observers use card to mark behaviors safe or at-risk
- After behaviors are marked, observer gives worker immediate, positive feedback
- Worker has opportunity to discuss any other safety concerns



Collecting Data

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Finding out why a behavior was performed at risk is critical

"I'm not wearing a dust mask because we ran out and the warehouse has not purchased more."



If a behavior is perceived to have been performed at-risk, the observer asks the worker why it was performed that way. The observer and the worker then discuss possible solutions for removing any barriers that are causing the worker to perform behaviors at-risk. All comments are recorded on the data card.



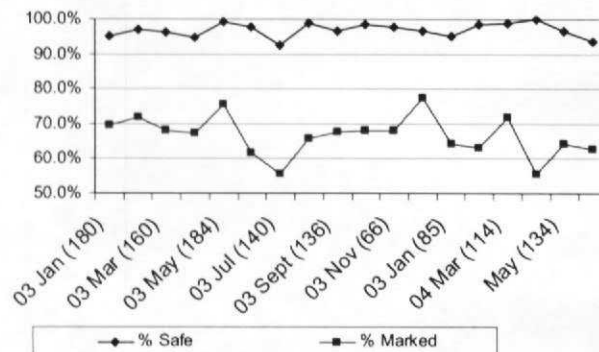
3. Providing Feedback

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Action planning occurs after data from cards are compiled

- Observation data are entered on a monthly basis
- Steering Team members meet to analyze trends and action plan on comments
- Data are presented at group meetings and trends are sent to observers

10.2 Line of Fire





Providing Feedback

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Actual Comments from Comment Report

While employee was working in a glovebox, employee did not check their hands coming out of the box. At risk for contamination. Employee said, "Good observation. I caught myself doing it and will slow down and make sure I always do it."

While employee was in glovebox, employee was at risk for static position (no mat on floor). Employee said they did not realize and was at a new workstation. Employee got a mat.

While employee was performing glovebox work, employee had long hair pulled back, out of employee's face and so it wouldn't be touching the glovebox. This is a good idea, and I routinely see people performing glovebox work who do not pull long hair back.

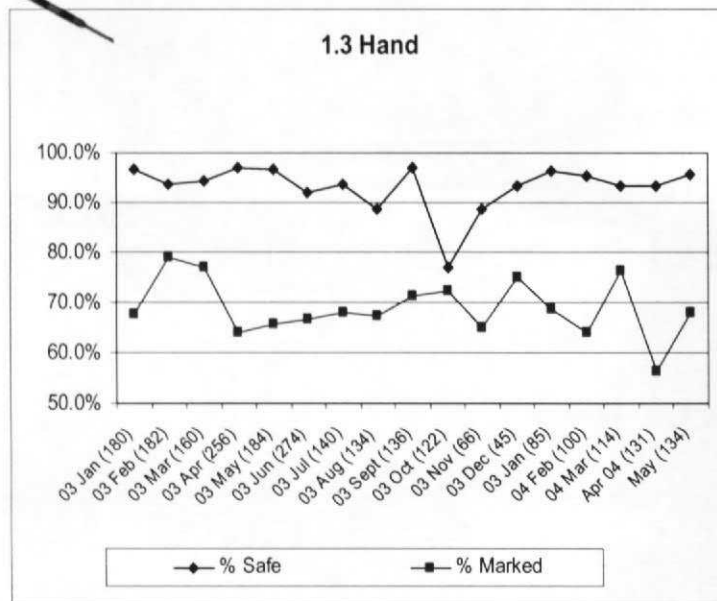


4. Use Data to Remove Barriers

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Behaviors that are declining in percent safe become targets



The percent safe for Hand PPE declined during the 1st quarter of 2004. After making it a targeted behavior for the 2nd quarter, the percent safe stabilized and later started to increase.

Every quarter, behavioral trends are analyzed. If the percent safe of any behavior is trending downward, it becomes a target behavior for the next quarter. Observers are asked to perform targeted observations as well as traditional observations.





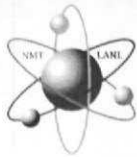
Use Data to Remove Barriers

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Example of barrier removal

- During observation, worker was at risk for spread of contamination. Worker was reaching under face shield to adjust goggles.
- Worker said she had to use goggles and face shield per procedure. This was quite cumbersome because she also wears prescription glasses.
- Through the observation comments, the steering team was able to action plan and have the hood sash lowered in the employee's lab.

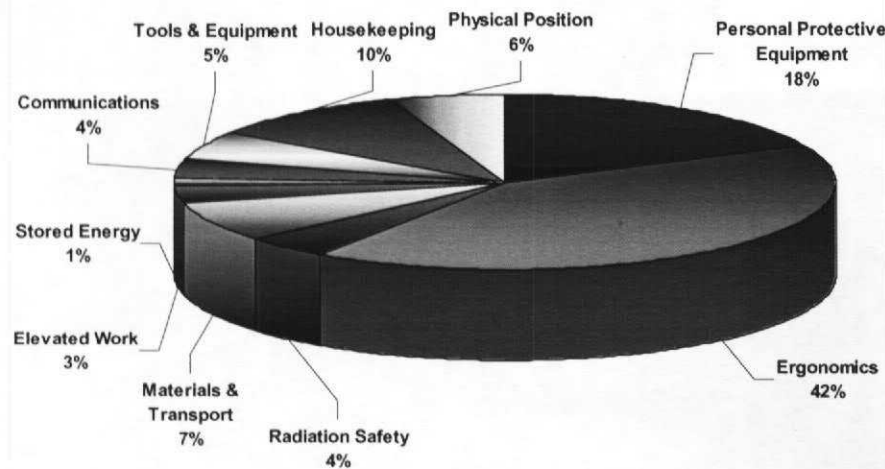




Observations Predict Injuries

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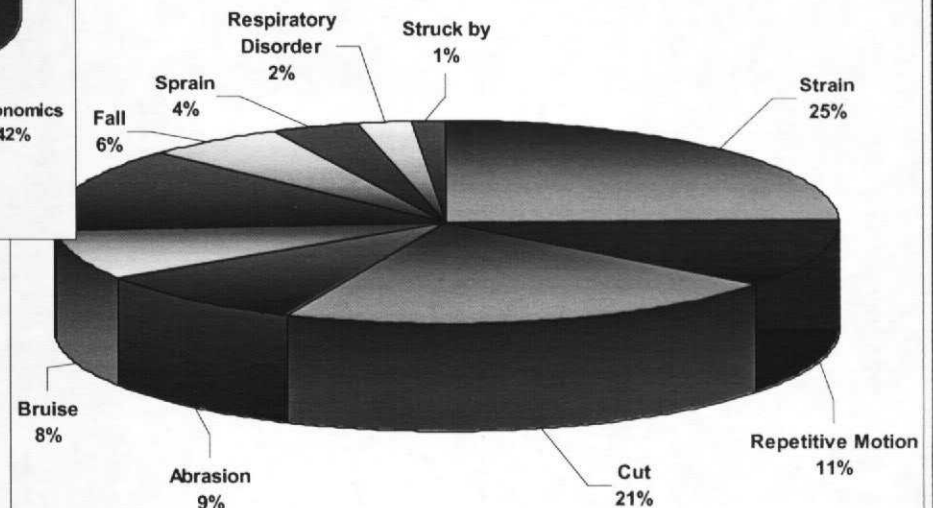
At-Risk Behaviors Observed
All Dates



Above:
Sixty percent of all at-risk behaviors consist of ergonomics and personal protective equipment

Below:
Fifty-seven percent of injuries are related to ergonomics (sprains & repetitive motion) and personal protective equipment (cuts)

Injuries by Type

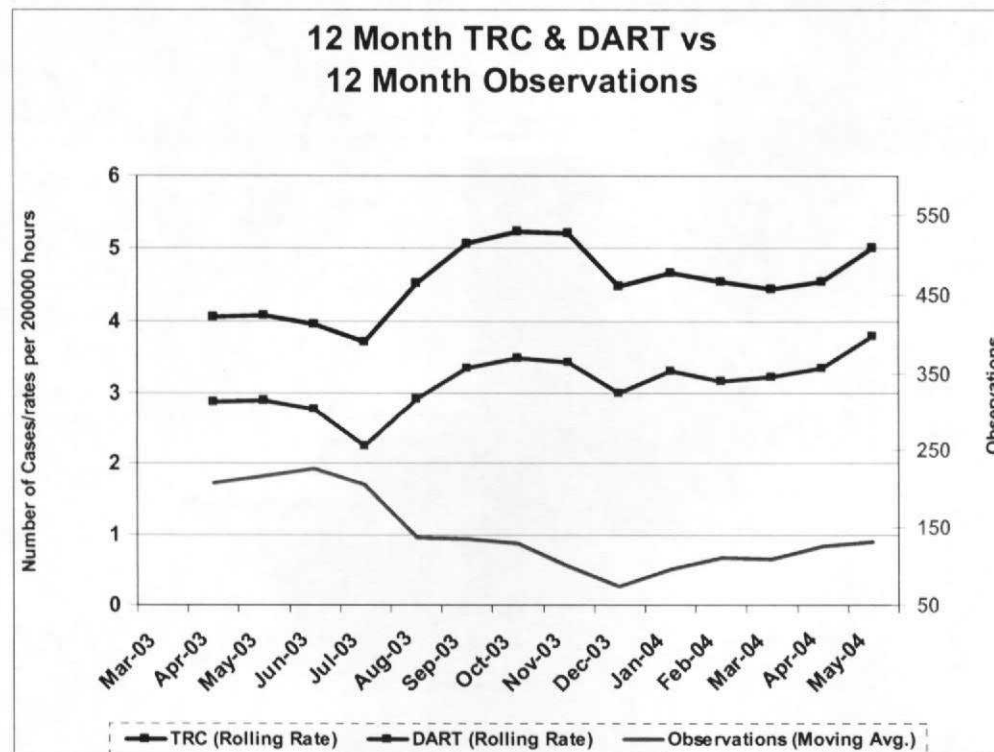




Mirror Effect

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As observations decrease, accidents and injuries increase



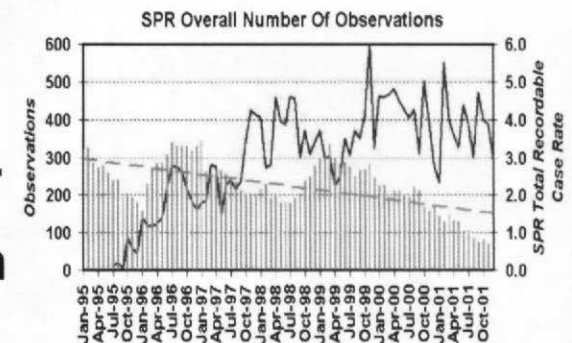
We can reverse this trend by reaching a contact ratio of one

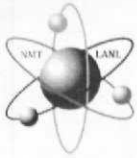


Contact Ratio

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- **Contact ratio is calculated by dividing the number of people observed per month by the number of employees in the organization.**
- **If every employee performed one observation a month, every individual in the division would:**
 - **receive positive feedback on their safe behaviors every month**
 - **be given the opportunity to change at-risk behaviors through barrier removal every month**
 - **have a chance to report safety concerns every month**

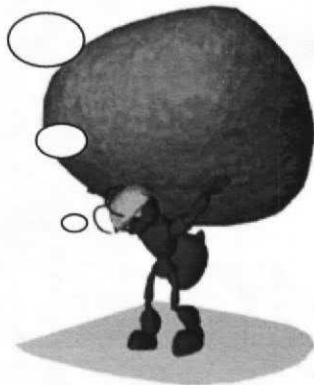




Challenges

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A little help...
anyone?



5% of employees are carrying the load of data collection for the rest of the division

The largest challenge the ATOMICS process has faced is data collection. As noted earlier, NMT Division consists of 1200 employees. For the process to be successful, every employee should perform one observation a month. Out of 750 trained observers, only an average of 60 observers perform monthly observations. Only 5% of the employees in the division are active observers.